

Abstract

Of an Invited paper presented at the
8th International Conference on Ion Sources
Kyoto, Japan, 6–10 September, 1999

Status of Vacuum Arc Ion Sources

Ian Brown

Lawrence Berkeley National Laboratory, University of California, Berkeley, California 94720

Vacuum arc ion sources have been developed and used in a growing number of laboratories around the world. Beams have been produced from most of the solid metals of the periodic table as well as alloys and mixtures, with ion energy up to several hundred keV and beam current up to several amperes. Typically the source is repetitively pulsed with a pulse length on the order of a millisecond and duty cycle of 1%, and dc operation has been demonstrated also. The main application has evolved to be for ion implantation, primarily for metallurgical, ceramic, and polymer surface modification (i.e., nonsemiconductor applications), but also for semiconductor implantation in some special cases; the source is also used for heavy ion injection into particle accelerators. This kind of high-current metal ion source has provided a valuable addition to the spectrum of ion sources available to the experimenter. Here the source fundamentals are briefly reviewed and the source performance and beam characteristics summarized. We survey some of the vacuum arc ion source development that has been accomplished over the past decade at many laboratories around the world, applications to which the source has been put, and recent progress in source innovations that has been accomplished by the community.

This work was supported by the U.S. DOE under Contract No. AC03-76SF-00098.